

CLAIMS

1. A chemical-mechanical polishing process for substrates used in the micro-electronics semiconductors industry containing at least one metal layer and one
5 insulator layer, separated, if necessary, by a barrier layer, in which the metal layer or layers and the barrier layer or layers are subjected to friction using a polishing pad by moving the substrate with respect to the pad and by pressing the substrate against the said pad, and an abrasive composition is deposited on the pad during the polishing, characterized in that the said process is carried out
10 in a single stage, in that the abrasive composition comprises:

- an acid aqueous suspension of individualized particles of colloidal silica, not linked to each other by siloxane bonds, having a mean
15 particle diameter of between 5 and 20 nm, and having a concentration by weight of silica of between 1 and 10%,
- an oxidizing agent,

and in that the metal layer and, if applicable, the barrier layer, is or are eliminated from the surface of the insulator in order to obtain a metal and insulator surface
20 not requiring any finishing polishing.

2. A chemical-mechanical polishing process according to claim 1, characterized in that the metal layer is produced from a metal selected from the group comprising aluminium, copper and tungsten, preferably tungsten, and that the barrier layer is
25 produced from a material selected from the group comprising titanium, tantalum, titanium nitride, tantalum nitride and any combination or alloy of at least two of them.

3. A chemical-mechanical polishing process according to claim 1 or 2, characterized in that the insulator layer is selected from the group comprising silicon oxide, tetraethoxysilane oxide, phosphosilicate glass, borophosphosilicate glass and polymers with a low dielectric constant, preferably from the group comprising
30 silicon oxide, tetraethoxysilane oxide, phosphosilicate glass and borophosphosilicate glass.

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4. A chemical-mechanical polishing process according to one of claims 1 to 3, characterized in that the oxidizing agent is an iodate, preferably potassium iodate or sodium iodate and that the oxidizing agent is used at a concentration by weight of between 0.1 and 15%, preferably at a concentration by weight of between 2 and 5%.
5. A chemical-mechanical polishing process according to one of claims 1 to 4, characterized in that the mean diameter of the individualized particles of colloidal silica, not linked to each other by siloxane bonds, is between 7 and 15 nm, preferably between 9 and 12 nm and that the acid aqueous suspension of colloidal silica is used at a concentration by weight of silica of between 2 and 5%.
6. A chemical-mechanical polishing process according to one of claims 1 to 5, characterized in that the acid aqueous suspension of colloidal silica is used at a pH of between 1 and 5, preferably between 1.5 and 3.
7. An abrasive composition for the chemical-mechanical polishing in one stage of substrates used in the microelectronics semiconductors industry containing at least one metal layer and one insulator layer, characterized in that the said abrasive composition comprises:
- an acid aqueous suspension of individualized particles of colloidal silica, not linked to each other by siloxane bonds, having a mean particle diameter of between 5 and 20 nm, and having a concentration by weight of silica of between 1 and 10%,
 - an oxidizing agent,
- and in that it is substantially free of anti-corrosion agent (< 0.05 % by weight).
8. A composition according to claim 7, characterized in that the oxidizing agent is an iodate, preferably potassium iodate or sodium iodate, and that the oxidizing agent is present at a concentration by weight of between 0.1 and 15%, preferably between 2 and 5%.

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9. A composition according to claim 7 or 8, characterized in that the mean diameter of the individualized particles of colloidal silica, not linked to each other by siloxane bonds, is between 7 and 15 nm, preferably between 9 and 12 nm.

5 10. A composition according to one of claims 7 to 9, characterized in that the acid aqueous suspension of colloidal silica has a concentration by weight of silica of between 2 and 5%, and has a pH of between 1 and 5, preferably between 1.5 and 3.

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